Abstract

Title: Detection of Signs of Fatigue in Functional Tests in Healthy Population by OpenPose

Objectives: The aim of this study is if the OpenPose system can detect changes in range of motion and unwanted movements of other segments in repetitive a full arm abduction test with weight and a single leg stance based on comparation of changes in angles and relative distances between first and last seconds of the movement.

Methods: This pilot study was dedicated to healthy people between 18 and 65 years. A video recording was made within an intervention while subjects were doing a full arm abduction test with weight and a single leg stance until the maximum endurance. Videorecording was processed by the OpenPose software which detects human movements base on algorithm without using a physical markers. Key point combinations (markers) were defined to obtain information about changes in movement and posture (angles, relative distances). Basic statistical measurements were done and compared between first and last seconds of the movement. Temporospatial data were collected to reach the results.

Results: Almost all differences in key point combinations to detect arm abduction movement were evaluated as statistically significant. Changes in single leg stance were usually evaluated as not statistically significant. There were found a noticeable difference between right and left side.

Conclusion: The goals of this thesis were achieved. It is possible to use the OpenPose system in detection of movement changes that occur due to muscle fatigue. Furthermore, this thesis points out another possible usage in practice and the importance of further research.

Keywords: Kinematic Analysis, Body Detection, Human Body Estimation, Markless System, Telerehabilitation